

1	(a) (i)	<p><b>A</b> smooth endoplasmic reticulum / SER</p> <p><b>B</b> nuclear, membrane / envelope ;</p> <p><b>C</b> mitochondrion ;</p> <p><b>D</b> nucleolus ;</p>	4	<p><i>mark first response on each line only</i></p> <p><b>ACCEPT</b> nucleus, membrane / envelope</p> <p><b>ACCEPT</b> mitochondria</p> <p><b>DO NOT ACCEPT</b> nucleous</p>
	(a) (ii)	<p>(mitochondria) vary in shape ; longer than wide ;</p> <p>cut in different planes / angles / AW ;</p> <p>just divided / growing ; artefact / deformed during preparation of section ;</p>	2 max	<p><b>ACCEPT</b> sausage shaped/long and thin</p> <p><b>ACCEPT</b> if shown by drawing</p> <p><i>need comparative statement</i></p> <p><b>ACCEPT</b> C has been cut in longitudinal plane, E has been cut in transverse, section / plane</p> <p><b>ACCEPT</b> one cut horizontally, other cut vertically</p> <p><b>ACCEPT</b> in different positions / one viewed from above the other from the side</p>
	(a) (iii)	<p><i>correct answer = two marks</i></p> <p>3.75 / 3.8 ;;</p> <p><i>if answer incorrect ALLOW one mark for correct working</i></p>	2	<p><b>ACCEPT</b> if 3.75 or 3.8 is seen anywhere in response (even if later rounded to 4)</p> <p><b>Max 1</b> if response is 4 with no working</p> <p><i>how to award one mark for working e.g.</i></p> <p>candidate shows correct calculation but wrong answer</p> <p>actual length = <math>\frac{20 \times 15}{80}</math></p> <p>OR</p> <p>candidate uses magnification (x4000) in calculation:</p> <p>actual length = 15000 / 4000 ;</p> <p>length of C should be 15mm / 15000µm</p> <p><b>ACCEPT</b> ecf for working mark if length of C is not measured correctly but incorrect figure is used in calculation correctly</p>
	(b) (ii)	<p>proteins moved to Golgi (apparatus / body) ; processed / modified / AW ;</p> <p>into vesicles ;</p> <p>(vesicle) moved to, plasma / cell surface, membrane ; (vesicles) fuse with membrane ; exocytosis ;</p>	3 max	<p>e.g. carbohydrate group added</p> <p><b>DO NOT ACCEPT</b> reprocessed</p> <p>idea that product of processing is placed into vesicles for transport</p> <p><b>DO NOT ACCEPT</b> vacuole – but do not penalise more than once</p> <p><b>DO NOT ACCEPT</b> 'cell membrane'</p>
				[Total: 11]
2	(a) (i)	<p><i>plant cell / Y, has:</i></p> <p>a wall ;</p> <p>chloroplasts ;</p> <p>vacuole ;</p>	max 2	<p>Credit reverse argument</p> <p><b>ACCEPT</b> thylakoid, discs / membranes OR granum(a)</p> <p><b>IGNORE</b> chlorophyll</p>
	(a) (ii)	<p><b>A1</b> a vacuole ;</p> <p><b>E1</b> to take up water / to become turgid ;</p> <p><b>A2</b> cell wall thicker on one side ;</p> <p><b>E2</b> causes, cell to bend / open stoma(ta) ;</p> <p><b>A3</b> mitochondria ;</p> <p><b>E3</b> generates ATP (for active transport) ;</p>	max 2	<p><i>Mark adaptation (A) as stand-alone</i></p> <p><i>Ensure explanation (E) stated is appropriately linked to adaptation</i></p> <p><b>DO NOT CREDIT</b> curved cell wall / thick cell wall unqualified</p> <p><b>ACCEPT</b> close stoma(ta) if adaptation correct</p> <p><b>IGNORE</b> ref to chloroplasts</p>

[Total: 4]

3	(a)		prokaryotic	eukaryotic	4	DO NOT ACCEPT chromatid
				as chromosomes / chromatin OR (genetic material) associated with, proteins / histones ;		Figures must have correct units ACCEPT any figure(s) in range 10 – 100 $\mu\text{m}$
				(diameter of cell) 20 – 40 $\mu\text{m}$ ;		ACCEPT any figure(s) in range 10 – 20 nm ACCEPT 70 S
		(ribosomes) 18nm ;		DO NOT ACCEPT sometimes or usually present		
		cell wall (present) ;				
	(b)	(i)	flagellum / cilium / microtubule / microfilament / undulipodium ;	1	ACCEPT plurals	
(b)	(ii)	(movement <u>inside cells</u> of)  chromosomes / chromatids (in cell division) ; (cytoplasm in) cytokinesis ; organelles / named organelle ;  RNA (in protein synthesis) ; proteins ;	2 max 7	DO NOT ACCEPT mitosis / cell division  e.g. centriole / vesicle / lysosome / mitochondrion / chloroplast / ribosome  ensure that the proteins are being moved in cytoplasm by microtubules rather than by ER or in vesicles (mark given above)		
		Total				

4	(a) (i)	production of vesicles / packaging proteins ;	max 1	<p><b>Mark the first answer.</b> If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b></p> <p><b>ACCEPT</b> lipids  <b>IGNORE</b> ref to transport / secretion / exocytosis / substances / materials  <b>DO NOT CREDIT</b> stores proteins</p> <p><b>ACCEPT</b> makes glycoproteins</p>
		modification of / processing of / adding carbohydrate to , proteins ;		
		production of lysosomes ;		
(a) (ii)		allow movement (of substances) in or out of nucleus ;	max 2	<p><b>IGNORE</b> messages / information / communication  <b>IGNORE</b> name of substance for MP 1  <b>IGNORE</b> ref to mechanism of movement</p> <p>e.g. RNA / (m)RNA / (r)RNA (t)RNA / polymerase / nucleotides / ribosomes / helicase / proteins / (steroid) hormones  <b>IGNORE</b> ref nutrients  <b>DO NOT CREDIT</b> if incorrect direction of movement described (e.g. RNA into nucleus <b>or</b> RNA in and out of nucleus)  <b>DO NOT CREDIT</b> DNA as named substance</p> <p><b>Note</b> 'allows mRNA out of nucleus' = <b>two marks</b></p> <p>e.g. RNA to ribosomes or RER          helicase to DNA          polymerase to , DNA / gene          nucleotides to DNA          (steroid) hormones to , DNA / gene / chromosome</p>
		correctly named substance (entering or leaving nucleus) ;		
		ref to correct destination of substance ;		

(a)	(iii)	contain / release , lysins / lytic enzymes / hydrolytic enzymes / digestive enzymes ;	max 1	DO NOT CREDIT 'engulf' DO NOT CREDIT 'lysosomes are digestive enzymes'
		digest / break down , organelles / foreign objects / toxins / cells / pathogens ;		ACCEPT destroy ACCEPT ref to digestion of contents of phagocytic vesicle IGNORE ref to (unwanted) substances / materials / food IGNORE ref to acrosomes
		apoptosis / autolysis / described ;		
(b)		idea of more than one (type of) tissue ;	2	ACCEPT named examples of tissues
		working together / performing a function(s) ;		ACCEPT job or task

[Total: 6]

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Question	Expected Answers	Marks	Additional Guidance
(a)	(i)	2 max	Mark the first <u>two</u> suggestions. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.  ACCEPT SER / RER / vesicle / cilia DO NOT CREDIT presence of ribosome / vacuole / flagellum / undulipodium
	(ii)		No tolerance in initial measurement = exactly 90mm  If answer is incorrect, allow one mark for correct working i.e. any measurement divided by 20 e.g. 8.9 / 20
	(iii)	2 max	Mark the first <u>two</u> suggestions. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.  IGNORE structure  IGNORE movement of (whole) cell  e.g. vesicles, cilia, mitochondria, ribosome
(b)	(i)	1	Mark the first answer. If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks. DO NOT CREDIT specialisation

[Total: 7]

6

(a)	<p><i>magnification is</i> the number of times larger the image is compared to the object ;</p> <p><i>resolution is</i> ability to, distinguish / differentiate between, two separate points</p> <p>OR the, level / degree, of detail that can be seen ;</p>	2	<p>ACCEPT alternative wording that implies quantitative comparison of image size with object size DO NOT CREDIT comparison of object to image (wrong way round)</p> <p>ACCEPT <math>\frac{\text{size of image}}{\text{size of object}}</math> or <math>\frac{\text{size of image}}{\text{actual size}}</math></p> <p>IGNORE makes image bigger unqualified</p> <p>IGNORE ref to clarity</p> <p>ACCEPT 'how detailed the image is'</p>
(b)	<p><i>light</i> 50 - 200 nm / 0.05 - 0.2 <math>\mu\text{m}</math> ;</p> <p><i>TEM</i> 0.05 - 1.0 nm ;</p>	2	<p>Mark the first answer for each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT a single figure within the range</p> <p>Units are required for both light &amp; TEM</p> <p>ACCEPT 0.00005 - 0.001<math>\mu\text{m}</math> or <math>5 \times 10^{-5}</math> - <math>1 \times 10^{-3}\mu\text{m}</math></p>
(c)	(i) 3 dimensional / 3D, (image) ; can see the surface (detail) ;	1 max	ACCEPT has depth of field / contours
(d)	<p>(named) membranes / phospholipid bilayer ; ribosomes ; Golgi ; endoplasmic reticulum / ER / RER / SER ; cytoskeleton / microtubules / microfilaments / spindle fibres ; centrioles ; vesicles / lysosomes ; mitochondria ;</p>	2 max	<p>Mark the first <u>two</u> suggestions eg plasma / cell surface / nuclear / thylakoid / cristae / tonoplast, chloroplast membrane</p> <p>DO NOT CREDIT flagellum / chromosomes / chromatin / nucleolus</p> <p>IGNORE ref to molecules</p>
	Total	10	